

What Are Subtle Energies?

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Abstract—A brief discussion is given of a set of anomalous experimental phenomena that are inexplicable based only on the four accepted forces operating in the physical universe. Possible explanations require defining the existence of subtle energies. Using a quantum mechanical description, the seat of subtle energy functioning is traced to the vacuum state with magnetic vector potential assuming the role of bridge between the subtle energies and physical energies. A brief discussion is given of how we might reliably detect subtle energies and a zeroth order model of the subtle domains as substructure for the vacuum state is given.

Introduction

To date, in conventional science, we have discovered four forces operating in the universe via which we try to explain all the observable phenomena of the universe. These are the strong nuclear force, the weak nuclear force, the electromagnetic force and the gravitational force. Of course, the energy associated with any one of these four forces is just the integral of the particular force with distance. However, for many decades, a growing body of experimental data has appeared that seems inexplicable based upon consideration of only these four forces. Some brief listing of a fragment of such data is given in the next section and these data seem to require the presence and action of what we shall call "subtle" energies for a satisfactory explanation. Subtle energies, then, are all the energies needed to explain this class of phenomena beyond the four fundamental energies that we already know and accept.

In what is to follow, the next section deals with a partial and brief recounting of experimental data whose explanation seems to fall beyond the scope of our accepted "world view." No attempt is made to list all the available data. The following section reviews the origin of matter and antimatter in this world view in order to reveal the required origin of subtle energies without indicating specifics or characteristics of such energies. The next section deals with how we might reliably measure such energies and the last section presents an overly simplistic model for viewing hierarchies in the subtle energy spectrum.

Anomalous Phenomena Needing A Subtle Energy Rationale

Up to this decade, science and medicine have considered living organisms as operating by means of the following sequence of reactions:

$$\text{Function} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Structure} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Chemistry} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Electric \& Magnetic Fields} \quad (1)$$

Whenever an organism wasn't functioning properly, the procedure was to blame structural-type defects in the system arising out of chemical imbalances. Recently, we have found that small electric currents between specific points in the brain give rise to the same behavioral changes that are observed with certain specific brain-stimulating chemicals (Woolridge, 1963). (Becker & Murray, 1970) and (Becker & Selden, 1985) and others have found that small D.C. electric currents can stimulate cells to regenerate, tissue to repair itself and fractures to heal faster.

An obvious defect in Eq. 1 is that it takes no account of mental effects. Under hypnosis, the human body has exhibited truly remarkable feats of strength and endurance attesting to an unconscious mind/structure link. In Aikido, Zen or Yoga disciplines, we see a conscious link between mental discipline and body function. On another front, modern psychotherapy shows us that certain chemical treatments induce mental states and certain mental treatments influence chemical states (Hawkins & Pauling, 1973.) Biofeedback techniques (Brown, 1975; Green, Elmer & Alyce, 1977) show us that directed mind can not only control various autonomic body functions like skin temperature, pain, etc., but also repair the body. Further, in a recent publication (Tiller, 1990), this author described a gas discharge device that responds to an energy emission from the body that is directed by mental intention. Thus, in this case, we see mind indirectly and remotely interacting with electron avalanches in a Townsend regime gas discharge. There seems to be little doubt then that mind, as a subtle energy, must be included in our equation so that it should read

$$\text{Function} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Structure} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Chemistry} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Electric \& Magnetic Fields} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Mind} \quad (2)$$

Experiments on remote viewing (Swann, 1975; Targ & Puthoff, 1977) have shown that people can (a) perceive and accurately describe objects placed several miles away from them, (b) be given the longitude and latitude coordinates of a location on the Earth and accurately describe the terrain of that location even though it is thousands of miles away and (c) tune in to a specific individual and view a remote locality through that individual's eyes. The remote viewer may even perceive the scene before the target individual gets there. Thus, the future time coordinate as well as the remote distance coordinates can be accessed using these techniques, possibilities not allowable via the presently accepted scientific paradigm. It is important to note that extensive, independent replication of remote viewing results has been documented (Targ & Harary, 1984). Here, we see applied mental activity producing results that seri-

ously bring into question our understanding of space-time and thus must involve some subtle energy linkage.

Motoyama placed a person who showed marked psychic ability and a second, ordinary person, in separate and remotely located rooms that were shielded by concrete walls lined with lead. The gifted person concentrated his mind on the other person while Motoyama monitored the subject's bodily functions (Motoyama, 1991). He found remarkable correlated changes in the subject's pulse, blood flow and respiration rate during the concentration period of the psychic individual. Since the two rooms appeared to be well shielded against physical energy passage, the cause/effect relationship required the involvement of one or more subtle energies. Here, we see not only a remote viewing aspect but also a psychokinetic (PK) aspect.

Years ago, Forwald (Forwald, 1969; Forwald, 1977) carried out - 15,000 PK experiments over a 15 to 20 year period on small wooden cubes. He showed a mathematical relationship between his ability to mentally influence the cubes and both the thickness and the chemical (nuclear) nature of the films. The Uri Geller-inspired PK work with children (Taylor, 1975; Hasted, 1981) and all the California "spoon bending" parties attest to remarkable action at a distance type phenomena. The more recent careful studies in the micro-PK area by Jahn and coworkers (Jahn, 1981; Jahn & Dunne, 1987) provides a substantial quantitative base to link the subject's mental intention and distantly applied force. Perhaps an analogous but more therapeutic remote influence falls under the category of healing and healers (Krieger, 1979; St. Clair, 1974, Krippner & Welch, 1992) with the process involving not only the mental domain but the emotional and spiritual domains as well. A recent study by Green, et al. (1991) of sensitives in a specially designed copper wall environment found that, for energy projectors (healers and Chi Gong Masters), anomalously large voltage pulses appeared in the body potential records whereas, for information perceivers, no such pulses were observed. Instead of the usual 10-50 mV baseline with - 1 mV ripple, the body potential often plunged to -30 to -300V and then recovered to baseline in 1 to 30 sec. This is an astoundingly large voltage pulse! In a single 90 min. healing session that took place in this special environment, one particular healer manifested sixteen anomalous bursts with each main burst being composed of 5-6 sub-pulses convolved in one envelope (Tiller, Green and Parks, 1993). It is likely that these voltage pulses are an electromagnetic correlate of the healing process taking place at subtle energy levels.

Karagulla (1967) has used clairvoyants to observe the "auric" fields around patients and thence describe their state of physical and mental health. These auric fields appear to the clairvoyant as patterns of light of different colours extending out from the body. Some clairvoyants can perceive the patterns with their eyes closed or in total darkness. Thus, these patterns are not composed from physical light and thus cannot be photographed with present day techniques. Pierrakos (1990), a psychiatrist who is also a clairvoyant, makes great use of his sensitivity in his practice. The auric field appears to be one or more

near-field radiation patterns from subtle levels of substance associated with the body much like the mathematically imaginary part of the electromagnetic radiation pattern from a physical antenna system. The detection ability, resident in some individuals, probably arises because of the advanced evolutionary state of a subtle sensory system in their body.

As a final example of a subtle energy phenomenon, let us select homeopathic remedies. The medical practice of homeopathy was greatly practiced in the last century while allopathic medicine is predominately practiced in this century. The point of singular interest concerning a homeopathic remedy is that its potency becomes stronger as it is progressively diluted with water and succeeded during the staged dilution (Vithoulkas, 1980). A high potency, on average, has less than one molecule of the physical herb or tincture per cc of homeopathic solution. Such behavior cannot be explained using our conventional scientific paradigm and demands an explanation at the subtle energy level.

As a conclusion to this section, experimental data has been referenced to indicate that Eq. 2 should be replaced by

$$\text{Function} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Structure} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Chemistry} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Electric \& Magnetic Fields} \begin{array}{c} \rightarrow \\ \leftarrow \end{array} \text{Subtle Energies} \quad (3)$$

where subtle refers to spiritual, mental, emotional, etc.

By subtle fields or energies, here, I do not mean weak fields or energies. To paraphrase Einstein, "Subtle is the Lord" does not refer to the Lord being weak. In most present day human experience, the subtle fields are normally only very weakly coupled to our physical fields so we generally see only small effects. However, under a favorable set of circumstances, they can be strongly coupled and then massive effects are possible. I suspect that our future technology in this area will reveal latent energy content and utilization of such subtle fields that are many orders of magnitude larger than that due to any of our presently known physical fields.

The Seat of Such Anomalous Phenomena as Viewed From The Conventional Paradigm

Quantum mechanics, which has only an empirical foundation, deals with the interaction between matter and everything else in the universe. At its simplest level, this means the interaction between matter and the vacuum state. In modern treatments, the vacuum is defined as the lowest energy state of the system whose equations obey wave mechanics and special relativity (it also has zero 4-momentum). The Dirac Equation, although Lorentz-invariant gives not only the energy states of particles but also predicts the existence of particles with negative energy (Aitchison & Hey, 1982). These negative energy states are unphysical and therefore unobservable with present day instrumentation. Nevertheless, by stimulating the negative energy states with sufficient energy, particles may be kicked into positive energy states and become real. The holes

left behind are the antiparticles. Thus, we can imagine that we live in a sea of virtual (unobservable) particles— the Dirac Sea. Since all physical observations represent finite fluctuations in energy and charge with respect to the vacuum state, this leads to an acceptable theory. To date, antiparticles have been found experimentally for all the particles known to physics.

Although hundreds of papers have been published in the past 30-40 years on considerations concerning the zero point vacuum state (Boyer, 1984; Milonni, 1980; Puthoff, 1988; Misner, Thorne & Wheeler, 1970; Wheeler, 1962; Bohm & Hiley, 1975), most physicists, chemists, biologists and engineers have little knowledge of the nature of this ground state for matter. Essentially, today the vacuum is seen as a chaotic sea of boundless energy (energy density equivalent $\sim 10^{94}$ grams/cm³ (Misner, Thorne & Wheeler, 1970) at the quantum relativity level with incredibly large destructive interference of wave functions; i.e., it is the domain where virtual particles and antiparticles are found. An interaction exists between this chaotic virtual particle sea and physical matter. It is this fundamental interaction that determines the ground state energies of all the atoms and thus all the molecules and all the condensed matter present in the universe. For example, if we could somehow alter this fundamental interaction, we should be able to change the ground state electrochemical potentials of reacting molecules in the cells of our bodies thus altering the body's state of function. In such a case, we may be able to observe the resultant physical changes but not the originating changes taking place in the Dirac Sea because our present instrumentation is inadequate for the task.

Lee (1982) points out that, in general, we may expect the vacuum to be as complex as any spin-0 field (boson field) of magnitude $\phi(x)$ at the zero 4-momentum limit. And, like a spin-0 field, it is conceivable that the vacuum state may carry quantum numbers such as isospin I, parity P, strangeness, etc. Lee (1982) shows that there is some justification for the idea that the properties of the vacuum can be altered physically by considering missing symmetry. If one adds up the symmetry quantum numbers of all matter, one finds these numbers to be constantly changing. However, if we also include the vacuum, then perhaps symmetry can be restored; i.e.,

$$\frac{d}{dt} \left\{ \begin{array}{c} \rightarrow \\ S \\ P \\ C \\ CP \\ \vdots \\ \vdots \\ \vdots \end{array} \right\} \neq 0 \qquad \frac{d}{dt} \left\{ \begin{array}{c} \rightarrow \\ S \\ P \\ C \\ CP \\ \vdots \\ \vdots \\ \vdots \end{array} \right\} = 0$$

Matter Matter + Vacuum

Perhaps in symmetry breaking, the vacuum expectation value is not zero

$$\langle \emptyset | \text{VAC} \rangle \equiv \langle \text{VAC} | \emptyset | \text{VAC} \rangle \neq 0 \quad (5)$$

If Eq. 5 is correct then, under suitable conditions, we must be able to produce excitations, or domain structures, in the vacuum having a volume much larger than microscopic dimensions.

To perform such a feat, it is necessary to calm the chaotic Dirac Sea so that less destructive and more constructive interference exists between the wave functions of this virtual level of reality. Such a task essentially involves controlling the phase of quantum mechanical wave functions. Since the latent energy potential of one cm^3 of vacuum is so huge, it may not be too difficult to "tilt" the situation a little.

To date, the one field present in our armory of fields that has been determined to control the phase of the quantum potential is \bar{A} , the magnetic vector potential. In 1959, Aharonov and Bohm (Aharonov, 1959) (AB) pointed out that it is potentials and not fields that appear in the equations of quantum mechanics. They predicted that the magnetic vector potential \bar{A} , exists as a field with physically measurable attributes even in the absence of other electromagnetic fields. For a long time, we have utilized the mathematical relationships

$$\Delta \bar{E} = -\frac{\partial \bar{A}}{\partial t} ; \Delta \bar{B} = \text{CURL } \bar{A} \quad (6a)$$

where \bar{E} is the electric field, t is time and B is the magnetic field. Of course, people usually like to write Eq. 6a in the form

$$\bar{E} = -\nabla\emptyset - \frac{\partial \bar{A}}{\partial t} ; \bar{B} = \text{CURL } \bar{A} \quad (6b)$$

where \emptyset is the scalar potential resulting from the electric charge distribution. In electrical engineering (Kraus & Carver, 1973), we also define \bar{A} as

$$\bar{A} = \frac{\mu_0}{4\pi} \int \frac{\bar{J}}{r} dv \quad (6c)$$

where the integral is over the volume, v , of magnetic permeability, μ_0 , through which the electric current, \bar{J} , passes. Before AB (Aharonov & Bohm, 1959), people felt that \bar{A} was just a mathematical invention, convenient for solving Maxwell's Equations of Electromagnetism and it had no physical reality.

To prove their prediction, AB proposed that, if a beam of electrons were forced to travel in the neighbourhood of a long solenoidal coil so that \bar{B} exists inside the coil but not outside (\bar{B} falls off as r^{-2} while A falls off as r^{-1} outside

the solenoid) (Kraus & Carver, 1973), the phase of the electron wave function would change because A was not zero but was finite. They predicted the results of a two-slit interference experiment for electrons. Later experiments in Japan by Tonomoura *et al* (1982, 1983, 1986) completely confirmed AB's predictions. Since then, many other experiments of a confirmatory nature have shown that the \bar{A} effect applies to bulk materials as well as to simple quantum systems and that it is a type of "many-body" potential.

An electron wave function, χ , is given by

$$\chi = \chi_0 \exp\left[\frac{ie}{\hbar c} \int \bar{A} d\bar{s}\right] \tag{7}$$

where $d\bar{s}$ is the electron path vector, e is the electron charge, c is the velocity of light and $\hbar = h/2\pi$ where h is Plank's constant. Wu and Yang (Wu & Yang, 1975) observed that, in the AB experiment, it is the phase factor in Eq. 7,

$$\exp\left[\frac{ie}{\hbar c} \int \bar{A} d\bar{s}\right], \text{ that is physically meaningful. Two electrons interfering}$$

result in

$$XX^* = |\chi_1|^2 + |\chi_2|^2 + 2|\chi_1||\chi_2| \exp\left[\frac{ie}{\hbar c} \left\{ \int \bar{A}_1 d\bar{s}_1, - \int \bar{A}_2 d\bar{s}_2 \right\}\right] \tag{8}$$

Here, the effective phase difference $\left\{ \int \bar{A}_1 d\bar{s}_1, - \int \bar{A}_2 d\bar{s}_2 \right\}$ may be observed directly in an interference experiment.

The logic chain is thus that (1) if we can generate an appropriate A -field, the quantum phase of a set of virtual particles in a certain spatial domain of the vacuum state can be adjusted to enhance the coherence of that domain of space and (2) if a soup of chemicals is placed in that spatial domain, the ground state electrochemical potentials of the molecules in that soup will be appropriately altered such that the normal chemical reactions are changed and new reaction possibilities occur. Such an anomalous result is not inconceivable based on the concepts discussed.

If we go a step further and postulate that the magnetic vector potential, \bar{A} , is the bridging potential between the subtle energy domains and the physical domain, then Eq. 6b may be thought of as only one term in a matrix of terms defining \bar{A} . Now, subtle domain influences are able to modify \bar{A} which then, in turn, can modify \bar{E} , \bar{B} and the quantum phase of real particles or virtual particles in the vacuum state. These changes can generate a variety of phenomena that we would all term "anomalous." As illustrations, (1) to rationalize the anomalous gas discharge effect of the previous section, if human intentionality activates a mental energy (subtle energy) that produces pulses of A emission from the body, then this could temporarily increase the \bar{E} field in the detector

via Eq. 6a so that the micro avalanche size in the detector would increase and counts appear in the recording system as observed; (2) to rationalize the anomalous voltage surges in healers, if the intentionality/subtle energy chain involved in the healing process produces, as a biproduct, pulses of \bar{A} from some body organ or system then the \bar{E} -field produced by Eq. 6a would act on the local electrolyte to produce growing followed by collapsing charge separation and thus generate the type of large voltage pulses observed in the Menninger Clinic experiments and (3) to rationalize remote glowing of fluorescent tubes or small psychokinetic events, once again the intentionality/subtle energy/ \bar{A} pulse chain radiated from the body via some type of natural antenna system could, via Eq. 6a, develop a significant magnitude of high frequency \bar{E} and \bar{B} pulses so as to allow these phenomena to occur via electromagnetic means.

It is well known that, when A is generated via a flux of current, \bar{J} , in some localized domain of physical space (see Eq. 6c), \bar{A} , \bar{E} and \bar{B} fall off strongly with distance. Thus, the suggestion that the anomalous phenomena mentioned here are the result of electromagnetic interactions between humans and their surroundings is not tenable because the available experimental data indicates that the key fields leading to these anomalous phenomena should be distance-independent. What is actually being suggested here is that one or more of the subtle fields operating at a substructural level of the vacuum state creates a 5- or 6-space potential distribution that is impressed globally on our 4-space and it is transduced into an analogous \bar{A} distribution globally in the 4-space. This \bar{A} contribution then generates \bar{E} and \bar{B} contributions that produce various types of action in the 4-space. In this fashion, although there exists some spatial dependence to \bar{E} and \bar{B} , there is no spatial dependence to \bar{A} because, unlike Eq. 6c, the \bar{A} generator is not localized in our 4-space.

How Might We Detect Subtle Energies in a Reliable Way?

From earlier discussion on healers, clairvoyants, etc., it is clear that humans are potential sources and conscious detectors of subtle energies. However, because of the normal temporal variations in human functioning, we don't make very reproducible "electrodes" so statistical data gathering type of research is needed to reveal trends (Jahn, 1981; Jahn & Dunne, 1987). At an unconscious level, humans also respond to subtle and physical energies at a muscular level. Conventional dowsing studies, wherein the dowser holding a wand walks over the ground being scanned, have shown (Harvalik, 1974; Walther, 1981) that the dowsing response is a muscular action connected by a sequence of biological processes to the cause, which may often be some type of magnetic field gradient. The seat of this sensing ability appears to be the adrenal glands (Harvalik, 1974). Osteopathic practitioners have shown that patient muscle tonus can change when specific minerals or chemicals (located in a glass jar) are merely held in the left hand or placed on the stomach. This category of technique falls under the general category of applied kinesiology (Walther, 1981)

with one of the most sensitive techniques being the Omura O-ring Test (Omura, 1985).

A second category of device for detecting subtle energies would be an electrical or mechanical device, connected directly or indirectly to a living system, that responds to this subtle energy via the effect on the living system as an essential transducer. The gas discharge device (Tiller, 1990) discussed earlier falls in this category. The Motoyama AMI device (Tiller, 1988), or other such device that monitors the electrical conductance properties of an array of acupuncture points, plus the Hunt devices (Hunt, 1989), that monitor the electrical properties of muscle groups in the body, are also examples of this category. Once again, because of the temporal variability of the living portion of the detection system, statistical data gathering types of research are needed to confirm trends.

A third category of device would be a "stand alone" type of device based on a unique logic system concerning subtle energy modelling and transductively linked to a physical level read-out system. This category of device would not suffer the temporal variability due to the living system portion of the detectors in the first two categories. However, we don't really have any such devices available for use. If, as proposed in the previous section, the magnetic vector potential, \bar{A} , is the bridging field between subtle energies and physical energies, then the first step would be to construct A-meters based on other components than squid-type of devices. Then, perhaps, \bar{A} probes of \approx mm dimensions could be constructed and used to learn more about the A-field dynamics around humans acting as subtle energy sources. The insights gained from such studies would be invaluable to theoretical modelling of the subtle domains. Until humans develop the conscious capacity to reliably detect and discriminate subtle energies, these energies will not be directly observable and useful devices will need a transducer capability to physically observe energies.

A Zeroth Order Working Hypothesis for Subtle Energy

If one wishes to work with or study subtle energies, it is useful to hold some simple model as a theoretical target against which one can compare actual experimental results. With the passage of time and the accumulation of experimental data, the model becomes refined and the theoretical target shifts in appropriate ways to be consistent with the experimental results. With physical phenomena, we are used to making intensity vs frequency (or some other field characteristic) types of plots to illustrate behavior. Let us presume that the Z-axis represents intensity while the X-axis represents frequency. Likewise, subtle plane phenomena could be looked at in a similar way so that the sum of their intensities versus the metaphorical frequency could be plotted in the Z-Y plane much as if it constituted the mathematically imaginary part of a complex frequency or other field characteristic. Then, the total Z(X,Y) plot would reveal the linear and non-linear interactions between the physical plane and sub-

Spiritual

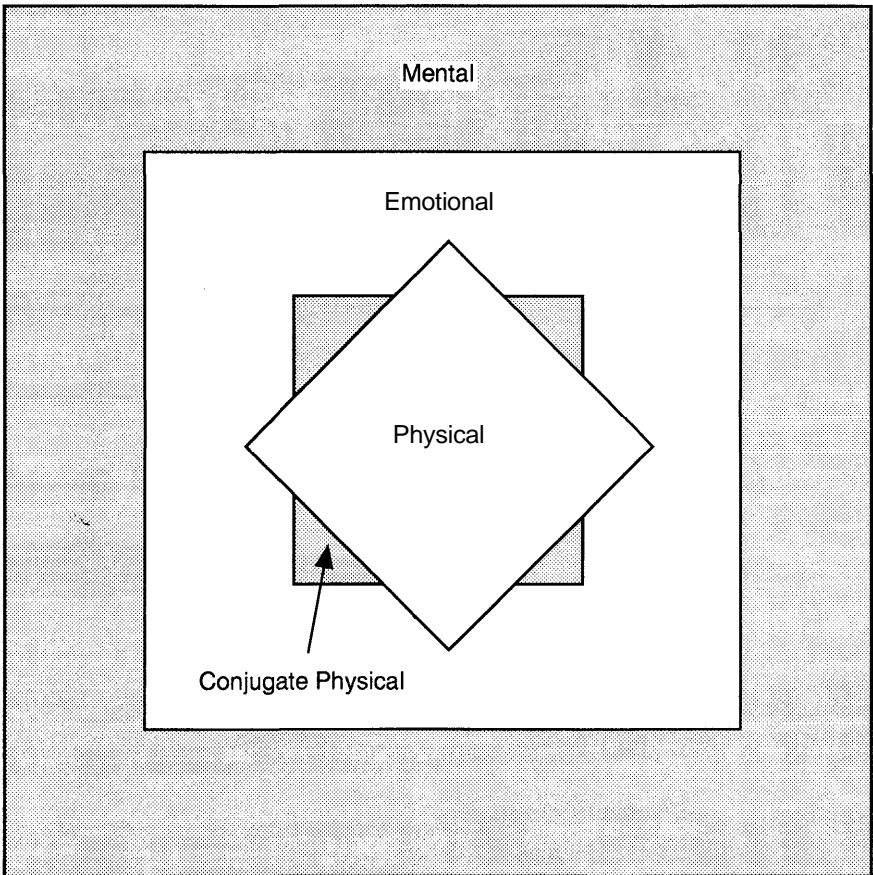


Fig.1.

tle plane phenomena. Of course, until we know more about these subtle energies, such a plot only has conceptual utility with little real accuracy.

To give some substructure to the general subtle energy domain of the vacuum state, all of which lies in the "unobservables" category, let us consider Figure 1 as a hierarchical representation of the relevant territories. Just as the physical territory phenomena are characterized and described in terms of the four accepted forces, each subtle domain is likely to have multiple unique energies involved in the various phenomena appropriate to that particular domain. Most of the domains listed in Figure 1 are familiar to us from our human experience. Only the conjugate physical domain will perhaps be new to some. Discussion of it is beyond the scope of this paper; however, its presence is delineated in Fig. 1 because it is thought, by this author, to be the domain where-

in homeopathy and remote viewing plus other phenomena have their roots. This author's writings and modeling of the past 20 years in this particular area have dealt extensively with the substructure of the vacuum state (without specifically calling it such) and with how the energies thought to function therein might account for these strange phenomena. This type of modeling is currently being revisited and refined and, at some future date, the results will be available for publication.

Conclusion

Subtle energies are real energies that are not directly observable because they function at the level of the "vacuum," the negative energy, chaotic Dirac Sea. They can be converted to an observable in our present human condition only via an intermediate transducer. Today, these transducers are primarily living systems. They account for a large class of experimentally observed phenomena that are quite inexplicable based solely on the accepted scientific paradigm of the four known forces operating in the physical universe. One known potential, the magnetic vector potential, appears to play the role of "bridge" between the subtle, unobservable energies and physically observable energies associated with electric and magnetic fields.

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